I CLAIM:

1. A motor device with an automatically adjustable output torque, comprising:

a hollow frame body including an inner surrounding wall surface that surrounds an axis and that confines an accommodating space extending in an axial direction parallel to the axis;

at least two magnetic pole pieces of opposite polarity disposed on said inner surrounding wall surface to extend in the axial direction and to be spaced diametrically apart from each other in a first transverse direction radial to the axial direction so as to produce a first magnetic field having a first magnetic flux therebetween;

an armature disposed to be rotatable between said two magnetic pole pieces, including:

an armature core including front and rear ends opposite to each other in the axial direction and having two first core segments diametrically opposite to each other in a second transverse direction radial to the axis such that said two first core segments are alternately brought to radially and spacedly face said two magnetic pole pieces, respectively, when said armature is rotated about the axis; and

an armature winding with first and second ends, said armature winding being disposed on said armature core to produce a second magnetic field having a second

magnetic flux in the second transverse direction when electric current flows therethrough via one of said first and second ends;

an output shaft disposed to extend from said front end of said armature core along said axis so as to be adapted to drive a wheel of a motorcycle;

a mounting shaft disposed to extend from said rear end of said armature core and coaxial to said output shaft;

a commutator disposed to be rotated with said mounting shaft about said axis, said commutator including two first conductive segments insulated from each other and respectively and electrically connected to said first and second ends of said armature winding;

two first brush members adapted to be respectively connected to first positive and negative electrodes of a first DC power supply, and disposed to respectively and slidably contact said two first conductive segments to provide a direct current to said armature winding via one of said two first conductive segments through one of said first and second ends of said armature winding, respectively, so as to initiate rotation of said armature as well as said commutator about the axis, while inducing a counter electromotive force in said armature, and to subsequently maintain the rotation by alternately providing the direct current to said first and second ends of said armature winding via alternate

and sliding contact of said two first brush members with said two first conductive segments, respectively;

a regulating winding with third and fourth ends adapted to be respectively connected to second positive and negative electrodes of a second DC power supply, said regulating winding being disposed on one of said armature core and said magnetic pole pieces to produce a third magnetic field having a third magnetic flux in one of the first and second transverse directions when electric current flows therethrough via one of said third and fourth ends;

a controlling member adapted to be disposed between said regulating winding and the second DC power supply and to be actuated to permit the flow of direct current from the second DC power supply through said third end to increase the flux amount of said first magnetic flux by adding that of said third magnetic flux so as to induce an increased counter electromotive force in said armature to thereby decrease the speed thereof when a greater torque is needed, or through said fourth end to diminish the flux amount of said first magnetic flux by counteraction of said third magnetic flux which is oriented in the opposite direction relative to that of said first magnetic flux so as to result in a decreased counter electromotive force in said armature to thereby increase the speed thereof when a lower torque is required; and

a sensor member disposed to actuate said controlling member in response to change of the speed of the wheel of the motorcycle.

2. A motor device according to Claim 1, wherein said sensor member includes a feedback circuit associated with the wheel such that a fluctuation of the speed of the wheel induces said feedback circuit to actuate said controlling member to direct the direct current from the second DC power supply to flow through one of said third and fourth ends.

3. A motor device according to Claim 1, wherein said regulating winding is disposed on said magnetic pole pieces, and said two magnetic pole pieces are two permanent magnets which include two magnetic poles of opposite polarity and oriented to be diametrically spaced from each other.

4. A motor device according to Claim 3, wherein said regulating winding includes two regulating winding units respectively disposed on said two permanent magnets so as to produce the third magnetic field having the third magnetic flux in the first transverse direction when the electric current flows therethrough via one of said third and fourth ends.

5. A motor device according to Claim 4, further comprising two mounting seat members disposed on said inner surrounding wall surface and diametrically spaced apart from each other in the first transverse

direction to receive therein said two permanent magnets, each of said two mounting seat members including a neck portion disposed on said inner surrounding wall surface and extending in the axial direction and in the first transverse direction towards the axis so as to be wound about a centerline parallel to said first transverse direction by said regulating winding, and an enlarged portion disposed on said neck portion and distal to said inner surrounding wall surface so as to form a retaining shoulder portion at a juncture between said neck portion and said enlarged portion, thereby preventing said regulating winding from slipping out of said neck portion.

6. A motor device with an automatically adjustable output torque, comprising:

a hollow frame body including an inner surrounding wall surface that surrounds an axis and that confines an accommodating space extending in an axial direction parallel to the axis;

at least two magnetic pole pieces of opposite polarity disposed on said inner surrounding wall surface to extend in the axial direction and to be spaced diametrically apart from each other in a first transverse direction radial to the axial direction so as to produce a first magnetic field having a first magnetic flux therebetween;

an armature disposed to be rotatable between said

two magnetic pole pieces, including:

an armature core including front and rear ends opposite to each other in the axial direction and having two pairs of first and second core segments, each pair of which are diametrically opposite to each other in one of second and third directions transverse to each other and radial to the axis such that said pairs of first and second core segments are alternately brought to radially and spacedly face said two magnetic pole pieces respectively when said armature is rotated about the axis; and

first and second armature windings respectively with a first set of first and second ends, and a second set of third and fourth ends, which are disposed respectively on said pairs of first and second core segments so as to produce second and third magnetic fields having second and third magnetic fluxes in the second and third transverse directions respectively when electric current flows therethrough via one of said first and second ends and via one of said third and fourth ends, respectively;

an output shaft disposed to extend from said front end along said axis so as to be adapted to drive a wheel of a motorcycle;

a mounting shaft disposed to extend from said rear end and coaxial to said output shaft;

a commutator disposed to be rotated with said

mounting shaft about said axis, said commutator including first and second pairs of conductive segments, said conductive segments of each of said first and second pairs being disposed diametrically spaced apart from each other relative to said axis, and being insulated from each other, said conductive segments of said first and second pairs being disposed alternately with each other, and wherein said conductive segments of said first pair are respectively and electrically connected to said first and second ends, and said conductive segments of said second pair are respectively and electrically connected to said third and fourth ends;

first and second pairs of brush members adapted to be respectively and electrically connected to first and second DC power supplies, said brush members of said first and second pairs being disposed alternately with each other in terms of the rotating path of said commutator;

said brush members of said first pair being disposed to respectively and slidably contact one of said first and second pairs of conductive segments when a corresponding one of said pairs of first and second core segments are brought to radially and spacedly face said two magnetic pole pieces respectively where a corresponding one of the second and third transverse directions is aligned with the first transverse

direction, so as to provide a direct current to a corresponding one of said first and second armature windings via a corresponding one of said first and second sets of ends and initiate rotation of said armature as well as said commutator about the axis, while inducing a first counter electromotive force in said armature, and to subsequently maintain the rotation by alternately providing the direct current to said first and second sets of ends via alternate and sliding contact of said brush members of said first pair with said first and second pairs of conductive segments, respectively;

said brush members of said second pair being disposed to respectively and slidably contact the other one of said first and second pairs of conductive segments so as to provide a direct current to the other corresponding one of said first and second armature windings via the other corresponding one of said first and second sets of ends, so as to produce the corresponding one of said second and third magnetic fluxes in the corresponding one of the second and third transverse directions which is transverse to the first transverse direction;

a controlling member adapted to be actuated to permit the flow of direct current from the second DC power supply through one of said first and second ends or through one of said third and fourth ends so as to

produce the corresponding one of said second and third magnetic fluxes in the corresponding one of the second and third transverse directions which is transverse to the first transverse direction, which has a flux component in the first transverse direction resulting in either an increase of the flux amount of said first magnetic flux when said flux component is at the same direction as said first magnetic flux, so as to induce an increased counter electromotive force in said armature to thereby decrease the speed thereof when a greater torque is needed, or a diminishing of the flux amount of said first magnetic flux when said flux component is at the opposite direction to said first magnetic flux so as to result in a decreased counter electromotive force in said armature to thereby increase the speed thereof when a lower torque is required; and

a sensor member disposed to actuate said controlling member in response to change of the speed of the wheel of the motorcycle.

7. A motor device with an automatically adjustable output torque, comprising:

a hollow frame body including an inner surrounding wall surface that surrounds an axis and that confines an accommodating space extending in an axial direction parallel to the axis;

at least two magnetic pole pieces of opposite

polarity disposed on said inner surrounding wall surface to extend in the axial direction and to be spaced diametrically apart from each other in a first transverse direction radial to the axial direction so as to produce a first magnetic field having a first magnetic flux therebetween;

at least two mounting core pieces disposed on said inner surrounding wall surface to extend in the axial direction and to be spaced diametrically apart from each other in the first transverse direction radial to the axial direction, said two mounting core pieces being oriented to be respectively spaced apart from and in alignment with said two magnetic pole pieces in the axial direction;

an armature disposed to be rotatable between said two magnetic pole pieces and between said two mounting core pieces, including:

an armature core including front and rear ends opposite to each other in the axial direction and having two first core segments diametrically opposite to each other in a second transverse direction radial to the axis such that said two first core segments are alternately brought to radially and spacedly face said two magnetic pole pieces, respectively, and to radially and spacedly face said two mounting core pieces, respectively, when said armature is rotated about the axis; and

an armature winding with first and second ends, said armature winding being disposed on said armature core to produce a second magnetic field having a second magnetic flux in the second transverse direction when electric current flows therethrough via one of said first and second ends;

an output shaft disposed to extend from said front end of said armature core along said axis so as to be adapted to drive a wheel of a motorcycle;

a mounting shaft disposed to extend from said rear end of said armature core and coaxial to said output shaft;

a commutator disposed to be rotated with said mounting shaft about said axis, said commutator including two first conductive segments insulated from each other and respectively and electrically connected to said first and second ends of said armature winding;

two first brush members adapted to be respectively connected to first positive and negative electrodes of a first DC power supply, and disposed to respectively and slidably contact said two first conductive segments to provide a direct current to said armature winding via one of said two first conductive segments through one of said first and second ends of said armature winding, respectively, so as to initiate rotation of said armature as well as said commutator about the axis, while inducing a counter electromotive force in said

armature, and to subsequently maintain the rotation by alternately providing the direct current to said first and second ends of said armature winding via alternate and sliding contact of said two first brush members with said two first conductive segments, respectively;

a regulating winding with third and fourth ends adapted to be respectively connected to second positive and negative electrodes of a second DC power supply, said regulating winding being disposed on one of said two mounting core pieces to produce a third magnetic field having a third magnetic flux in one of the first and second transverse directions when electric current flows therethrough via one of said third and fourth ends;

a controlling member adapted to be disposed between said regulating winding and the second DC power supply and to be actuated to permit the flow of direct current from the second DC power supply through said third end to increase the flux amount of said first magnetic flux by adding that of said third magnetic flux so as to induce an increased counter electromotive force in said armature to thereby decrease the speed thereof when a greater torque is needed, or through said fourth end to diminish the flux amount of said first magnetic flux by counteraction of said third magnetic flux which is oriented in the opposite direction relative to that of said first magnetic flux so as to result in a decreased

counter electromotive force in said armature to thereby increase the speed thereof when a lower torque is required; and

a sensor member disposed to actuate said controlling member in response to change of the speed of the wheel of the motorcycle.